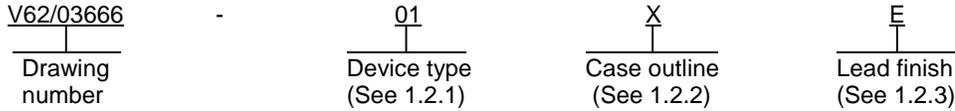


1. SCOPE

1.1 Scope. This drawing documents the general requirements of a high performance triple 2-channel analog multiplexer/demultiplexer microcircuit, with an operating temperature range of -40°C to +105°C.

1.2 Vendor Item Drawing Administrative Control Number. The manufacturers PIN is the item of identification. The vendor item drawing establishes an administrative control number for identifying the item on the engineering documentation:



1.2.1 Device type(s).

<u>Device type</u>	<u>Generic</u>	<u>Circuit function</u>
01	74LV4053A-EP	Triple 2-channel analog multiplexer/demultiplexer

1.2.2 Case outline. The case outline shall be as specified herein.

<u>Outline letter</u>	<u>Number of pins</u>	<u>JEDEC PUB 95</u>	<u>Package style</u>
X	16	JEDEC MO-153	Plastic small-outline
Y	16	JEDEC MS-012	Plastic small-outline

1.2.3 Lead finishes. The lead finishes shall be as specified below or other lead finishes as provided by the device manufacture:

<u>Finish designator</u>	<u>Material</u>
A	Hot solder dip
B	Tin-lead plate
C	Gold plate
D	Palladium
E	Gold flash palladium

1.3 Absolute maximum ratings. 1/

Supply voltage range (V_{CC}).....	-0.5 V to +7.0 V
Input voltage range (V_I).....	-0.5 V to +7.0 V 2/
Switch I/O voltage range (V_{IO}).....	-0.5 V to $V_{CC} + 0.5 V$ 2/ 3/
Input clamp current (I_{IK}) ($V_I < 0$).....	-20 mA
I/O diode current (I_{IOK}) ($V_{IO} < 0$ or $V_{IO} > V_{CC}$).....	±50 mA
Switch through current (I_T) ($V_{IO} = 0$ to V_{CC}).....	±25 mA
Continuous current through V_{CC} or GND.....	±50 mA
Package thermal impedance (θ_{JA}): 4/	
Case outline X.....	108°C/W
Case outline Y.....	73°C/W
Storage temperature range (T_{STG}).....	-65°C to +150°C

1/ Stresses beyond those listed under “absolute maximum rating” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

2/ The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

3/ This value is limited to 5.5 V maximum.

4/ The package thermal impedance is calculated in accordance with JESD 51-7.

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 16236	DWG NO. V62/03666
		REV A	PAGE 2

1.4 Recommended operating conditions. 1/

Supply voltage range (V_{CC}).....	2.0 V to 5.5 V	2/
Minimum high level input voltage (V_{IH}), control inputs:		
$V_{CC} = 2.0\text{ V}$	1.5 V	
$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	$V_{CC} \times 0.7$	
$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	$V_{CC} \times 0.7$	
$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	$V_{CC} \times 0.7$	
Maximum low level input voltage (V_{IL}), control inputs:		
$V_{CC} = 2.0\text{ V}$	0.5 V	
$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	$V_{CC} \times 0.3$	
$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	$V_{CC} \times 0.3$	
$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	$V_{CC} \times 0.3$	
Control input voltage range (V_I).....	0.0 V to 5.5 V	
Input/output voltage range (V_{IO}).....	0.0 V to V_{CC}	
Maximum input transition rise or fall rate ($\Delta t/\Delta v$):		
$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	200 ns/V	
$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	100 ns/V	
$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	20 ns/V	
Operating free-air temperature range (T_A).....	-40°C to +105°C	

2. APPLICABLE DOCUMENTS

- JEDEC PUB 95 - Registered and Standard Outlines for Semiconductor Devices
- JESD 51-7 - High Effective Thermal Conductivity Test Board for Leaded Surface Mount Packages

(Applications for copies should be addressed to the Electronic Industry Alliance, 2500 Wilson Boulevard, Arlington, VA 22201-3834 or at <http://www.jedec.org>)

1/ All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

2/ With supply voltages at or near 2 V, the analog switch on-state resistance becomes very nonlinear. It is recommended that only digital signals be transmitted at these low supply voltages.

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 16236	DWG NO. V62/03666
		REV A	PAGE 3

3. REQUIREMENTS

3.1 Marking. Parts shall be permanently and legibly marked with the manufacturer's part number as shown in 6.3 herein and as follows:

- A. Manufacturer's name, CAGE code, or logo
- B. Pin 1 identifier
- C. ESDS identification (optional)

3.2 Unit container. The unit container shall be marked with the manufacturer's part number and with items A and C (if applicable) above.

3.3 Electrical characteristics. The maximum and recommended operating conditions and electrical performance characteristics are as specified in 1.3, 1.4, and table I herein.

3.4 Design, construction, and physical dimension. The design, construction, and physical dimensions are as specified herein.

3.5 Diagrams.

3.5.1 Case outlines. The case outlines shall be as shown in 1.2.2 and figure 1.

3.5.2 Truth table. The truth table shall be as shown in figure 2.

3.5.3 Logic diagram. The logic diagram shall be as shown in figure 3.

3.5.4 Terminal connections. The terminal connections shall be as shown in figure 4.

3.5.5 Timing waveforms and test circuits. The timing waveforms and test circuits shall be as shown in figure 5.

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 16236	DWG NO. V62/03666
		REV A	PAGE 4

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions	V _{CC}	Temperature, T _A	Device type	Limits		Unit
						Min	Max	
On-state switch resistance	r _{on}	I _T = 2 mA V _I = V _{CC} or GND V _{INH} = V _{IL} See figure 5	2.3 V	25°C	01		180	Ω
				-55°C to 125°C			225	
			3.0 V	25°C		150		
				-55°C to 125°C		190		
			4.5 V	25°C		75		
				-55°C to 125°C		100		
Peak on-state resistance	r _{on(p)}	I _T = 2 mA V _I = V _{CC} or GND V _{INH} = V _{IL}	2.3 V	25°C	01		500	Ω
				-55°C to 125°C			600	
			3.0 V	25°C		180		
				-55°C to 125°C		225		
			4.5 V	25°C		100		
				-55°C to 125°C		125		
Difference in on-state resistance between switches	Δr _{on}	I _T = 2 mA V _I = V _{CC} or GND V _{INH} = V _{IL}	2.3 V	25°C	01		30	Ω
				-55°C to 125°C			40	
			3.0 V	25°C		20		
				-55°C to 125°C		30		
			4.5 V	25°C		15		
				-55°C to 125°C		20		
Control input current	I _i	V _I = 5.5 V or GND	0.0 V to 5.5 V	25°C	01		±0.1	μA
				-55°C to 125°C			±1.0	
Off-state switch leakage current	I _{S(off)}	V _I = V _{CC} and V _O = GND, or V _I = GND and V _O = V _{CC} V _{INH} = V _{IH} See figure 5	5.5 V	25°C	01		±0.1	μA
				-55°C to 125°C			±1.0	
On-state switch leakage current	I _{S(on)}	V _I = V _{CC} or GND V _{INH} = V _{IH} See figure 5	5.5 V	25°C	01		±0.1	μA
				-55°C to 125°C			±1.0	
Quiescent supply current	I _{CC}	V _I = V _{CC} or GND	5.5 V	25°C, -55°C to 125°C	01		20.0	μA

See footnotes at end of table.

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 16236	DWG NO. V62/03666
		REV A	PAGE 5

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions	V _{CC}	Temperature, T _A	Device type	Limits		Unit				
						Min	Max					
Control input capacitance	C _{IC}			25°C	01	2.0 TYP		pF				
Common terminal capacitance	C _{IS}			25°C	01	8.2 TYP		pF				
Switch terminal capacitance	C _{OS}			25°C	01	5.6 TYP		pF				
Feed-through capacitance	C _F			25°C	01	0.5 TYP		pF				
Power dissipation capacitance	C _{pd}	C _L = 50 pF f = 10 MHz	3.3 V	25°C	01	5.3 TYP		pF				
Propagation delay time, COM or Y _n to Y _n or COM	t _{PLH} , t _{PHL}	C _L = 15 pF See figure 5	2.3 V and 2.7 V	25°C	01		10.0	ns				
				-55°C to 125°C			16.0					
			3.0 V and 3.6 V	25°C		6.0						
				-55°C to 125°C		10.0						
			4.5 V and 5.5 V	25°C		4.0						
				-55°C to 125°C		7.0						
			Propagation delay time, INH to COM or Y _n	t _{PZH} , t _{PZL}	C _L = 15 pF See figure 5	2.3 V and 2.7 V	25°C		01		18.0	ns
							-55°C to 125°C				23.0	
3.0 V and 3.6 V	25°C					12.0						
	-55°C to 125°C					15.0						
4.5 V and 5.5 V	25°C					8.0						
	-55°C to 125°C					10.0						
Propagation delay time, INH to COM or Y _n	t _{PHZ} , t _{PLZ}	C _L = 15 pF See figure 5				2.3 V and 2.7 V	25°C	01		18.0	ns	
							-55°C to 125°C			23.0		
			3.0 V and 3.6 V	25°C		12.0						
				-55°C to 125°C		15.0						
			4.5 V and 5.5 V	25°C		8.0						
				-55°C to 125°C		10.0						

See footnote at end of table.

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 16236	DWG NO. V62/03666
		REV A	PAGE 6

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions	V _{CC}	Temperature, T _A	Device type	Limits		Unit
						Min	Max	
Propagation delay time, COM or Y _n to Y _n or COM	t _{PLH} , t _{PHL}	C _L = 50 pF See figure 5	2.3 V and 2.7 V	25°C	01		12.0	ns
				-55°C to 125°C			18.0	
			3.0 V and 3.6 V	25°C		9.0		
				-55°C to 125°C		12.0		
			4.5 V and 5.5 V	25°C		6.0		
				-55°C to 125°C		8.0		
Propagation delay time, INH to COM or Y _n	t _{PZH} , t _{PZL}	C _L = 50 pF See figure 5	2.3 V and 2.7 V	25°C	01		28.0	ns
				-55°C to 125°C			35.0	
			3.0 V and 3.6 V	25°C		20.0		
				-55°C to 125°C		25.0		
			4.5 V and 5.5 V	25°C		14.0		
				-55°C to 125°C		18.0		
Propagation delay time, INH to COM or Y _n	t _{PHZ} , t _{PLZ}	C _L = 50 pF See figure 5	2.3 V and 2.7 V	25°C	01		28.0	ns
				-55°C to 125°C			35.0	
			3.0 V and 3.6 V	25°C		20.0		
				-55°C to 125°C		25.0		
			4.5 V and 5.5 V	25°C		14.0		
				-55°C to 125°C		18.0		
Frequency response (switch on), COM or Y _n to Y _n or COM		C _L = 50 pF R _L = 600 Ω f _{in} = 1 MHz (sine wave) ^{1/} See figure 5	2.3 V	25°C	01	30 TYP		MHz
			3.0 V	25°C		35 TYP		
			4.5 V	25°C		50 TYP		
Crosstalk (between any switches), COM or Y _n to Y _n or COM		C _L = 50 pF R _L = 600 Ω f _{in} = 1 MHz (sine wave) ^{2/} See figure 5	2.3 V	25°C	01	-45 TYP		dB
			3.0 V	25°C		-45 TYP		
			4.5 V	25°C		-45 TYP		
Crosstalk (control input to signal output), INH to COM or Y _n		C _L = 50 pF R _L = 600 Ω f _{in} = 1 MHz (square wave) See figure 5	2.3 V	25°C	01	20 TYP		mV
			3.0 V	25°C		35 TYP		
			4.5 V	25°C		65 TYP		

See footnotes at end of table.

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 16236	DWG NO. V62/03666
		REV A	PAGE 7

TABLE I. Electrical performance characteristics - Continued.

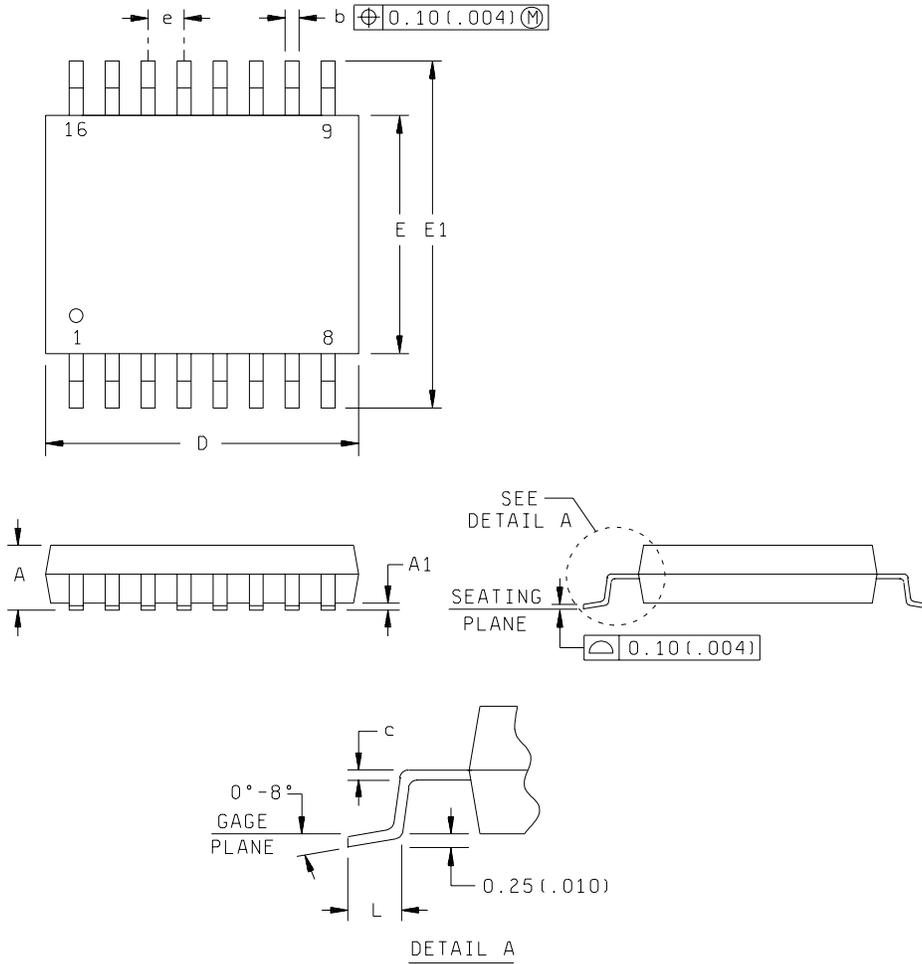
Test	Symbol	Conditions	V _{CC}	Temperature, T _A	Device type	Limits		Unit
						Min	Max	
Feed-through attenuation (switch off), COM or Yn to Yn or COM		C _L = 50 pF R _L = 600 Ω f _{in} = 1 MHz <u>2/</u> See figure 5	2.3 V	25°C	01	-45 TYP		dB
			3.0 V	25°C		-45 TYP		
			4.5 V	25°C		-45 TYP		
Sine wave distortion, COM or Yn to Yn or COM		C _L = 50 pF R _L = 10 kΩ f _{in} = 1 kHz (sine wave) See figure 5	V _I = 2.0 V _{p-p}	2.3 V	01	0.1 TYP		%
			V _I = 2.5 V _{p-p}	3.0 V		0.1 TYP		
			V _I = 4.0 V _{p-p}	4.5 V		0.1 TYP		

1/ Adjust f_{in} voltage to obtain 0-dBm output. Increase f_{in} frequency until dB meter reads -3 dB.

2/ Adjust f_{in} voltage to obtain 0-dBm input.

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 16236	DWG NO. V62/03666
		REV A	PAGE 8

Case X



NOTES:

1. This drawing is subject to change without notice.
2. Body dimensions do not include mold flash or protrusion not to exceed 0.15 mm.
3. Falls within JEDEC MO-153.
4. All linear dimensions are shown in millimeters (inches). Inches equivalents are given for general information only.

FIGURE 1. Case outlines.

<p>DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO</p>	<p>SIZE A</p>	<p>CODE IDENT NO. 16236</p>	<p>DWG NO. V62/03666</p>
		<p>REV A</p>	<p>PAGE 9</p>

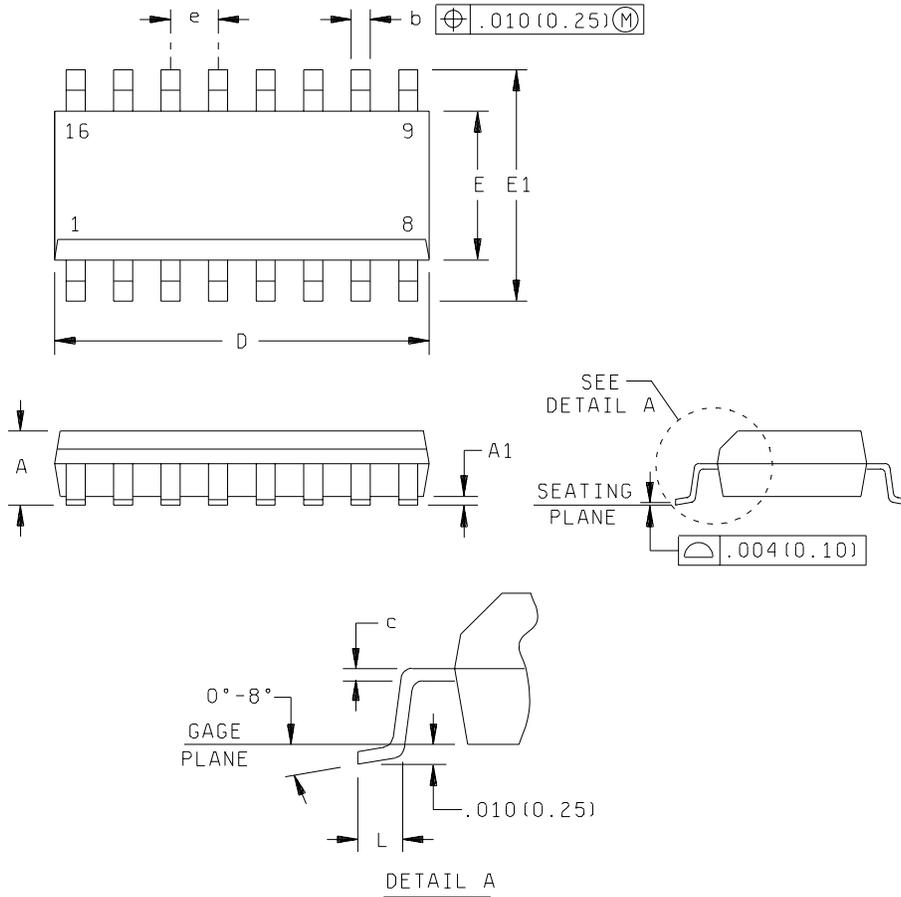
Case X

Symbol	Dimensions			
	Millimeters		Inches	
	Min	Max	Min	Max
A	---	1.20	---	.047
A1	0.05	0.15	.002	.006
b	0.19	0.30	.007	.012
c	0.15 NOM		.006 NOM	
D	4.90	5.10	.193	.201
E	4.30	4.50	.169	.177
E1	6.20	6.60	.244	.260
e	0.65 NOM		.026 NOM	
L	0.50	0.75	.020	.030

FIGURE 1. Case outlines - Continued.

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 16236	DWG NO. V62/03666
		REV A	PAGE 10

Case Y



NOTES:

1. This drawing is subject to change without notice.
2. Body dimensions do not include mold flash or protrusion not to exceed 0.006 inches (0.15 mm).
3. Falls within JEDEC MS-012.
4. All linear dimensions are shown in inches (millimeters). Millimeters equivalents are given for general information only.

FIGURE 1. Case outlines - Continued.

<p>DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO</p>	<p>SIZE A</p>	<p>CODE IDENT NO. 16236</p>	<p>DWG NO. V62/03666</p>
		<p>REV A</p>	<p>PAGE 11</p>

Case Y

Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	---	0.069	---	1.75
A1	0.004	0.010	0.10	0.25
b	0.014	0.020	0.35	0.51
c	0.008 NOM		0.20 NOM	
D	0.386	0.394	9.80	10.00
E	0.150	0.157	3.81	4.00
E1	0.228	0.244	5.80	6.20
e	0.050 NOM		1.27 NOM	
L	0.016	0.044	0.40	1.12

FIGURE 1. Case outlines - Continued.

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 16236	DWG NO. V62/03666
		REV A	PAGE 12

Inputs				On Channels
INH	C	B	A	
L	L	L	L	1Y0, 2Y0, 3Y0
L	L	L	H	1Y1, 2Y0, 3Y0
L	L	H	L	1Y0, 2Y1, 3Y0
L	L	H	H	1Y1, 2Y1, 3Y0
L	H	L	L	1Y0, 2Y0, 3Y1
L	H	L	H	1Y1, 2Y0, 3Y1
L	H	H	L	1Y0, 2Y1, 3Y1
L	H	H	H	1Y1, 2Y1, 3Y1
H	X	X	X	None

X = Immaterial

FIGURE 2. Truth table.

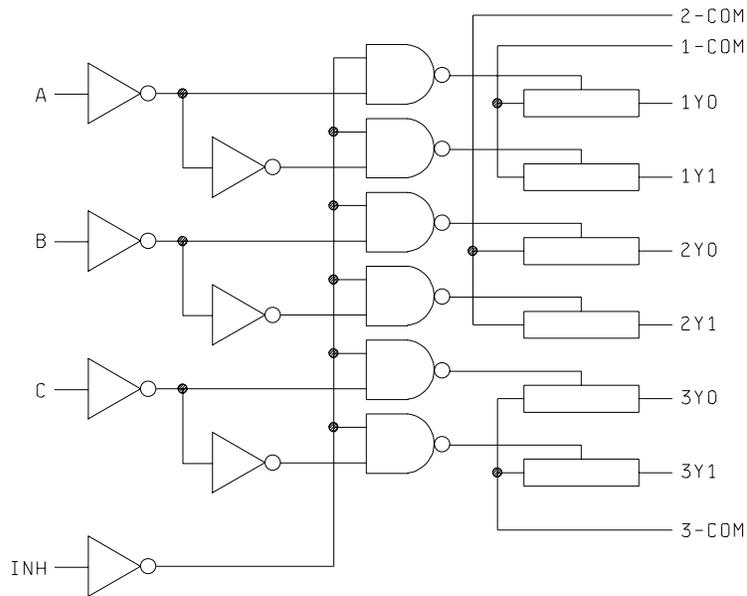


FIGURE 3. Logic diagram.

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 16236	DWG NO. V62/03666
		REV A	PAGE 13

Device type	01
Case outlines	X, Y
Terminal number	Terminal symbol
1	2Y1
2	2Y0
3	3Y1
4	3-COM
5	3Y0
6	INH
7	GND
8	GND
9	C
10	B
11	A
12	1Y0
13	1Y1
14	1-COM
15	2-COM
16	V _{CC}

FIGURE 4. Terminal connections.

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 16236	DWG NO. V62/03666
		REV A	PAGE 14

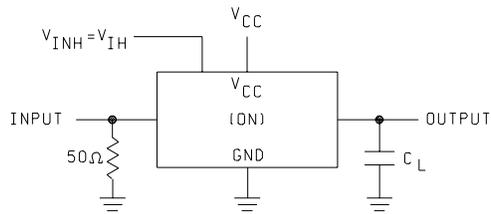
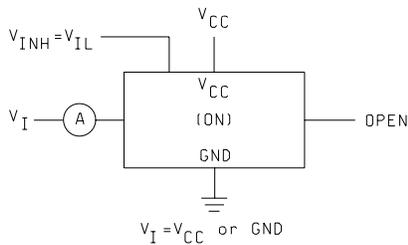
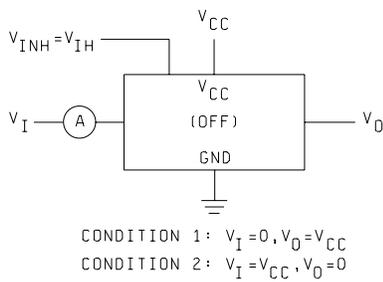
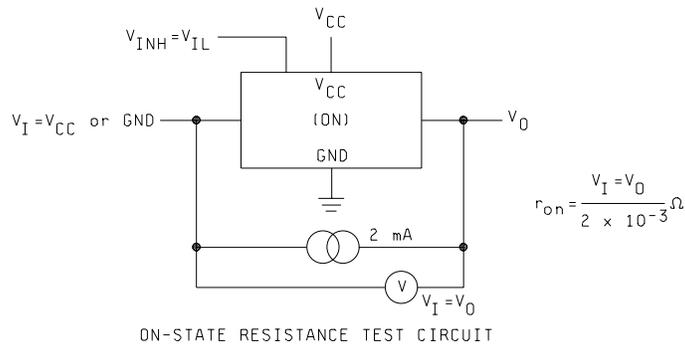
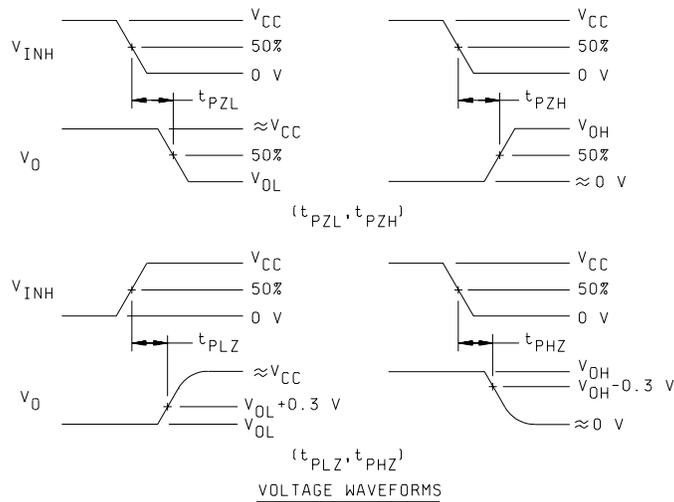
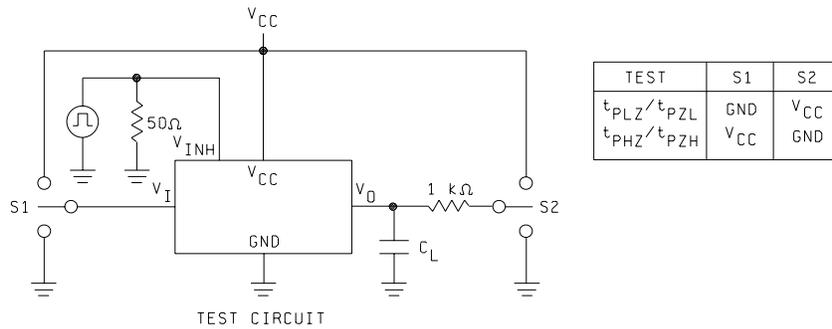
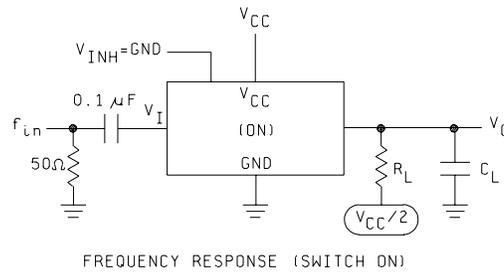


FIGURE 5. Timing waveforms and test circuits.

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 16236	DWG NO. V62/03666
		REV A	PAGE 15



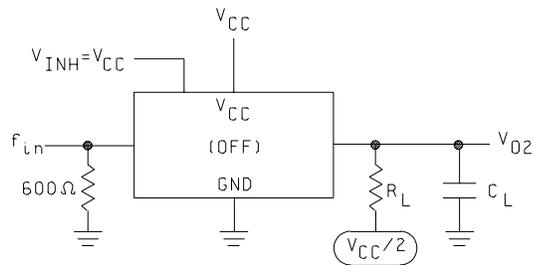
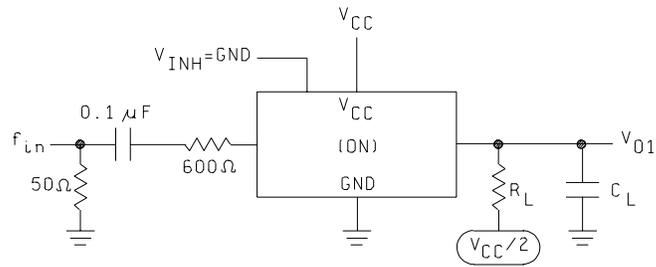
SWITCHING TIME ($t_{PZL}, t_{PLZ}, t_{PZH}, t_{PHZ}$), CONTROL TO SIGNAL OUTPUT



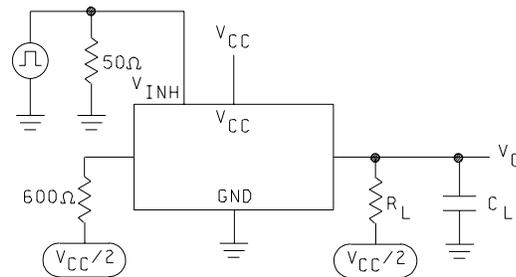
NOTE: f_{in} is a sine wave.

FIGURE 5. Timing waveforms and test circuits - Continued.

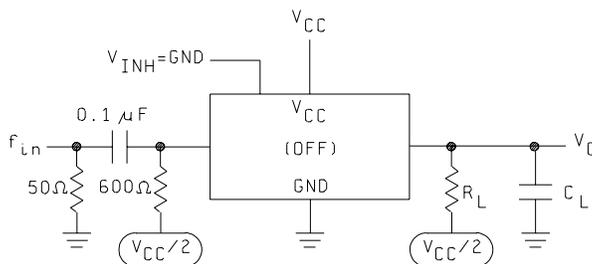
<p>DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO</p>	<p>SIZE A</p>	<p>CODE IDENT NO. 16236</p>	<p>DWG NO. V62/03666</p>
		<p>REV A</p>	<p>PAGE 16</p>



CROSSTALK BETWEEN ANY TWO SWITCHES



CROSSTALK BETWEEN CONTROL INPUT AND SWITCH OUTPUT



FEED-THROUGH ATTENUATION (SWITCH OFF)

FIGURE 5. Timing waveforms and test circuits - Continued.

<p>DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO</p>	<p>SIZE A</p>	<p>CODE IDENT NO. 16236</p>	<p>DWG NO. V62/03666</p>
		<p>REV A</p>	<p>PAGE 17</p>

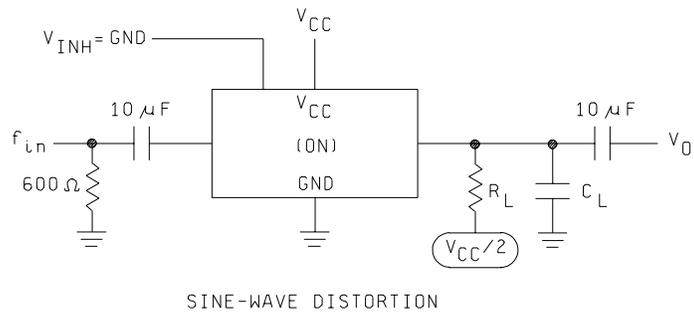


FIGURE 5. Timing waveforms and test circuits - Continued.

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 16236	DWG NO. V62/03666
		REV A	PAGE 18

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Product assurance requirements. The manufacturer is responsible for performing all inspection and test requirements as indicated in their internal documentation. Such procedures should include proper handling of electrostatic sensitive devices, classification, packaging, and labeling of moisture sensitive devices, as applicable.

5.0 PREPARATION FOR DELIVERY

5.1 Packaging. Preservation, packaging, labeling, and marking shall be in accordance with the manufacturer's standard commercial practices for electrostatic discharge sensitive devices.

6.0 NOTES

6.1 ESDS. Devices are electrostatic discharge sensitive and are classified as ESDS class 1 minimum.

6.2 Configuration control. The data contained herein is based on the salient characteristics of the device manufacturer's data book. The device manufacturer reserves the right to make changes without notice. This drawing will be modified as changes are provided.

6.3 Suggested source(s) of supply. Identification of the suggested source(s) of supply herein is not to be construed as a guarantee of present or continued availability as a source of supply for the item.

Vendor item drawing administrative control number <u>1/</u>	Device manufacturer CAGE code	Vendor part number	Top-Side Marking
V62/03666-01XE	01295	SN74LV4053ATPWREP	L4053EP
V62/03666-01YE	01295	SN74LV4053ATDREP	LV4053ATEP

1/ The vendor item drawing establishes an administrative control number for identifying the item on the engineering documentation.

CAGE code

01295

Source of supply

Texas Instruments, Inc.
 Semiconductor Group
 8505 Forest lane
 P.O. Box 660199
 Dallas, TX 75243
 Point of contact: U.S. Highway 75 South
 P.O. Box 84, M/S 853
 Sherman, TX 75090-9493

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 16236	DWG NO. V62/03666
		REV A	PAGE 19